REMARKS

Applicant responds herein to the Office Action dated June 12, 2003. A Petition for Extension of Time (three months) and the fee therefor are enclosed.

Claim 1, 3, 4 stand rejected on grounds of obviousness over Sivaramakrishnan et al. (US 5,879,574) in view of Nishizawa et al. (US 6,464,793); Tsuchimoto (US 3,916,034) and Powell et al. (US 6,287,643). Alternatively, the Examiner is rejecting the same claims 1, 3 and 4 on grounds of obviousness over Sivaramakrishnan, in view of Nishizawa et al., Tsuchimoto and Schmitt et al. (US 5,356,672). To meet claim 2, the Office Action relies on the references noted above, further in view of Amano et al. (US 5,948,485). Reconsideration is requested in view of the amendments to the claims herein and the following remarks.

In the introductory text of the present specification -- for example, the paragraph at page 5, beginning at line 13 -- it is explained that in the case of conventional multi-component materials, such as where a BST is being deposited by using conventional ALD, the absorption temperature and the reactive temperature need to be repeatedly varied depending on the source gas containing each material component. This significantly and adversely impacts the throughput of wafer production and causes other problems.

The present invention judiciously and inventively incorporates a variety of technical expedients to avoid the drawbacks of the prior art.

With specific reference to independent claim 1, the present invention is not directed to a conventional chemical vapor (CVD) deposition apparatus, but rather to an apparatus known in the art as an ALD apparatus that is utilized for atomic layer deposition. Further, and again in order to greatly increase the throughput, two separate gases supply pipe are provided for supplying different material gases. Still further, and in order to more precisely control the material deposition at the atomic level, the two supply pipes are coaxially arranged whereby one pipe surrounds the other. Still further, at least two remote plasma generators are installed outside the reactive chamber and connected to the gas supply pipes to alternatively activate material gases supplied through the gas supply pipes in a manner enabling operation without requiring temperatures stabilization times by minimizing absorption of the reactive gas and temperature sensitivity of chemical reaction materials comprised of plural different components that are to be deposited as the film. Lastly, a temperature controller controls the temperature inside the chamber.

By carefully choosing different structural features and combining them together in a precise manner, the instant inventors have been able to overcome the aforementioned drawback of the prior art and achieve substantially increased wafer production throughput and an improved final product.

To the extent that the Office Action contends that, since it is possible to find individual elements of the present invention in separate and disparate pieces of the prior art, the overall combination provided by claim 1 is rendered obvious, the applicant must respectfully disagree and draws the Examiner's kind attention to the Federal Circuit's decision in *Panduit Corporation v. Dennison Manufacturing Co.*, 1 USPQ2d 1593 (Fed.Cir. 1987). In that decision, the Federal Circuit expressed and explained the impropriety of utilizing the disclosed invention as a guide to combine the references on the basis of hindsight, as by arbitrarily selecting different features from different references, the Federal Circuit stated:

> "Virtually all inventions are necessarily combinations of old elements. The notion, therefore, that combination claims can be declared invalid merely upon finding similar elements in separate prior patents would necessarily destroy virtually all patents and cannot be the law under the statute, Section 103".

Turning to the references that the Office Action has cited against claim 1, it is initially noted that none of them discloses a control system that rapidly introduces different materials from different pipe without having to be concerned about temperature stabilization and the other effects that the prior art conventionally contends with. Even more specifically, Sivaramakrishnan et al. (US 5,879,574) relates to a conventional chemical vapor deposition apparatus, which apparatus is considered in the art to be wholly different from the atomic layer deposition (ALD) apparatus of the present invention. In particular, this reference describing a CVD process is not appropriate for use in forming the ultra-thin film composed of plural and different components with a thickness thereof being precisely controlled as in the instant invention.

Nishizawa relates to a semiconductor crystal growth apparatus which also differs from and is considered in the art to be an apparatus unrelated to atomic layer deposition. Although the Office Action contends that this reference discloses a vessel 1 with nozzles 4 and 5 for introducing gaseous compounds, where the nozzle 4 and 5 are provided with on off valves 6 and 7 for controlling the introduced amounts of gaseous compounds, the cited reference is not considered to be appropriate to form the ultra-thin film of the present invention which is composed of plural and different components, since this reference also teaches that one of the pipes serves to inject enchant gas, rather than reaction gases.

The Examiner also relied on Tsuchimoto, contending that this reference teaches two or more plasma generators installed outside the reactive chamber. But once again, the particular arrangements are different from the present invention in that the reference is not designed to form an ultra-thin film composed of plural components by supplying an activating plural material gases alternatively. Still further, the Office Action has cited and turned to Powell and Schmidt as purportedly teaching two concentrically arranged pipes. However, careful review of these references reveals that they inject reaction gases simultaneously, rather than alternatively.

The foregoing discussion highlights the utilization of hindsight to reject claim 1, by turning to disparate references for various features that are described in their own settings and context for purposes different than that of the present invention. Even when all of these references are combined, none of them teaches the alternative supplying of different material gases without having to wait for and depend on the turning on and off of these sources of materials for temperature stabilization and other considerations, as in the prior art. Based on the overall combination of claim 1, as described and explained above, it is respectfully submitted that claim 1 clearly distinguishes over the prior art, and is not rendered obvious thereby. These remarks are also applicable to dependent claims 2-4, and since these claims also include further limitations not discussed above, they clearly distinguish over the prior art.

Accordingly, the Examiner is respectfully requested to reconsider the application, allow the claims as amended and pass this case to issue.

An Information Disclosure Statement enclosing copies of an Office Action with references issued in Korea in relation to a corresponding application are enclosed.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on December 10, 2003

Max Moskowitz
Name of applicant, assignee or Registered Representative

Signature

December 10, 2003
Date of Signature

Respectfully submitted,

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